REMARKS

Claims 1-45 are pending in the present application. Claims 1, 22 and 30 are the

independent claims. In the Office Action, dated February 4, 2004, claims 1-8, 12-13, 16, 21-23,

27-35 and 39 were rejected under 35 U.S.C. § 103(a) as allegedly obvious over U.S. Patent No.

6,385,706 (Ofek et al.) in view of U.S. Patent No. 5,644,766 (Coy et al.).

Further, with respect to the dependent claims, claims 9-11 and 36-38 were rejected under

35 U.S.C. § 103(a) as allegedly unpatentable over Ofek et al. in view of Coy et al. and in further

view of "A Simple and Efficient Parallel Disk Mergesort" (Barve et al.). Claims 14 and 41 were

rejected under 35 U.S.C. § 103(a) as allegedly obvious over Ofek et al. in view of Coy et al. and

further in view of U.S. Patent No. 5,864,863 (Boebert et al.). Claims 15 and 40 were rejected

under 35 U.S.C. § 103(a) as allegedly obvious over Ofek et al. in view of Coy et al. and further

in view of U.S. Patent No. 5,784,646 (Sawada). Claims 17, 24, and 42 were rejected under 35

U.S.C. § 103(a) as allegedly obvious over Ofek et al. in view of Coy et al. and further in view of

"XML: Not a Silver Bullet, But a Great Pipe Wrench" (Usdin et al.). Claims 18, 25, and 43 were

rejected under 35 U.S.C. § 103(a) as allegedly obvious over Ofek et al. in view of Coy et al. and

further in view of U.S. Patent No. 6,343,265 (Glebov et al.). Claims 19-20 and 44-45 were

rejected under 35 U.S.C. § 103(a) as allegedly obvious over Ofek et al. in view of Coy et al. and

further in view of U.S. Patent No. 5,564,037 (Lam). Claim 26 was rejected under 35 U.S.C. §

103(a) as allegedly obvious over Ofek et al. in view of Coy et al. and further in view of U.S.

Patent No. 6,233,600 (Salas et al.).

Initially, Applicants appreciate the extraordinary time and effort the Examiner has placed

into drafting the February 4, 2004 Official Action. As explained below, however, Applicants

continue to feel that the claimed invention patentably defines over the cited references of record.

Summary of the Invention

Prior to Applicants' invention, the state of the art in hierarchical storage management for

files did not cover partial migration of files in most contexts, i.e., it address the *generic* desire

of a user to migrate predetermined part(s) of a file from a first location to a second location while

retaining other part(s) of the file at the first location. In this regard, the state of the art did not

provide a mechanism for specifying those regions of a data stream suited to writes and updates

and those regions of a data stream suited to off-line or remote storage. In short, sometimes it is

desirable to migrate predetermined part(s) of files to remote storage and to *retain other part(s)*

in local storage and *current file servers do not enable native support for and specification of*

which data to keep and which data to export elsewhere.

The present invention provides such partial migration abilities, and meanwhile, preserves

the data relationships of the migrated part(s) to the unmigrated part(s) via file system metadata as

a roadmap to reconstruction of the original file. Thus, for example, if part of a Word Processing

document were partially migrated to remote storage, for example, the file system of the present

invention enables operations on the original document in its entirety without regard to the fact

that some of the document may have been migrated to remote storage.

The Meaning of the Term "Migrate"

In Applicants' February 6, 2003 response, Applicants clarified the term "migrate" and illustrated how the partial migration capabilities of the invention differ from common file system operations available today, and in particular, differ from the systems disclosed in Ofek et al.

Applicants first explained that the terms "migration" or "to migrate" in connection with the present invention are being used in common with their ordinary dictionary usage, meaning "to move from one place, or locality to another." In the context of the migration of data, therefore, the term migration as used throughout the present application means to move the data from one place, or memory location, to another place, or memory location, freeing the memory space previously allocated to store the data for other use.

It was also noted by Applicants that a "move" operation is known in the file system art, and Applicants do not claim to have invented the "move" operation. A prior art move operation merely enables a user of a file system to move a file from a first memory location to a second memory location, so that the file is no longer located at the first memory location. Thus, in the case of a move operation, in contradistinction to the present invention, the entire file, file system metadata and data alike are moved from the first memory location to the second memory location. The invention differs from a move operation because the invention enables a partial migration, or partial move, operation wherein only part(s) of a file are moved to a second storage location, while other part(s) of the file remain at the first storage location, generating metadata to describe the new relationships of the file.

Then, Applicants distinguished over another presently existing capability. Namely, today, a user can take a file, and with a presently existing file system, break the file into two or more pieces, and then export, or move, one or more of the pieces to a second location, in which case the original file would then be located in more than one place. However, the invention provides a partial migration ability that distinguishes over such a case as well. With such a presently existing scenario, the user would be creating brand new file system metadata, i.e., new files, for each piece of the file, while losing the information about the old file system metadata. Additionally, the notion of the original file would be lost, since there would no longer be any file system data or metadata that linked the pieces together, as a roadmap to illustrate how the pieces fit together to form the original file. Thus, in short, such a scenario would destroy the notion of the original file to the file system.

𝒴 Thus, the prior art nowhere teaches or suggests a file system that provides a partial migration capability, *wherein part(s) of a file can be moved* from a first memory location to a second memory location, **and** wherein the notion of "the file" stays intact, i.e., the relationships of the migrated data of the file to the unmigrated data of the file is preserved. In this regard, the present invention provides such a system.

Rejections under 35 U.S.C. § 103

As mentioned above, in the Official Action, claims 1-45 were rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over primary references Ofek et al. in view of Coy et al. and

invariably in further view of any of Barve et al., Boebert et al., Sawada, Usdin et al., Glebov et al., Lam or Salas et al. The outstanding rejections to the claims are respectfully traversed.

In Applicants' November 7, 2003 response, Applicants have stipulated that Ofek et al. is understood to disclose a system relating to backing up a hard drive, in which two things are admittedly disclosed: (1) that one or more files can be *copied* (not moved or migrated) to a backup location remote from local storage (and thus entire files of the entire hard drive can be copied to a backup location) and (2) that only what has changed on a hard drive from a first time to a second time need be copied to remote storage as part of the backup process and thus only a portion of some files on the hard drive need be *copied* (not moved or migrated) to remote storage. See, e.g., Fig. 14, block 146 for copy operation.

Such *copying* results in a whole file or part of a file that *remains in local storage* while a copy of it (the whole or the part) is placed in a remote storage. Conversely, in the claimed invention, *partial migration* results in part of a file that is *removed from local storage* and which is then stored in remote storage. This difference affects how the corresponding metadata determine the relationships between the contents of the local storage and the contents of remote storage. On the one hand, *the metadata of Ofek et al. relate copies of a file*: "The copy of the logical object may be an abstract bloc set" (Abstract), where "the abstract block set includes metadata ... [which] is any recorded information that provides a mechanism to reconstruct the order of logical data blocks as they appear in the logical object" (Col. 21, lines 47-50). On the other hand, *the metadata of the present application relate different parts of a file*, where the

parts are stored in different locations, namely, where one part is stored in local storage and the

other (and different part) is stored in a remote storage (Claims 1, 22, and 30). In the end then,

such storage based on *partial migration* results in the appearance to a user that the entire file is in

local storage (Application, page 14, lines 8-10). In Ofek et al., however, the appearance is

clearly that there is an original file in the local storage and a separate back-up file in remote

storage (Figure 6 and 13). In short, the two inventions differ because they use *different*

mechanisms (partial migration versus back-up copying) to produce *different results* (appearance

of the whole file on local storage versus appearance that there is an original file and a remotely

stored back-up file). Applicants thus respectfully submit that the *partial migration* of claims 1,

22, and 30 patentably defines over the Ofek et al. back-up system.

In summary, Applicants contend that nowhere does Ofek et al. teach or suggest:

migrating the at least one portion to the second storage location, wherein the migrating

includes (A) relocating the at least one portion from the first storage location to the second

location and (B) generating additional file system metadata relating to the stream of data; and

preserving the stream's data relationships via the additional file system metadata, whereby the

entire stream of data remains accessible to a user of the file system as if the at least one portion

of the stream of data were not migrated according to the migrating (claim 1),

a data structure stored on a computer-readable medium for storing metadata relating to

migration characteristics of a stream of data wherein at least one portion is migrated via a file

system from a first storage location to a second storage location wherein the migration includes

relocation of the at least one portion from the first storage location to the second location and

generation of additional file system metadata relating to the stream of data, comprising: an

identifier identifying the stream of data for which at least one portion is migrated; data

representative of the storage service used in connection with the migration of the at least one

portion; and data representative of the memory mappings of the at least one migrated portion,

whereby the entire stream of data remains accessible to a user of the file system as if the at least

one portion of the stream of data were not migrated (claim 22), or

a computer system including a file system for migrating a portion of a stream of data

having associated file system metadata from a first storage location to a second storage location

in a computer system, wherein the migrating means to relocate the at least one portion from the

first storage location to the second location and generate additional file system metadata relating

to the stream of data, comprising: a hierarchical storage management (HSM) system for

administering a stream of data for partial migration; and a source storage location having a

stream of data stored thereon being serviced by the HSM system; wherein the HSM system

identifies and migrates at least one portion of the stream of data to a target storage location

according to pre-set criteria and generates metadata for the description of data relationships of

the at least one migrated portion, whereby the entire stream of data remains accessible to a user

of the file system as if the at least one portion of the stream of data were not migrated according

to the migrating (claim 30).

Coy et al. was cited for its teachings relating to migration of data in a hierarchical

management system wherein when the amount of data in a storage pool reaches a high

occupancy threshold specified by the administrator, data objects can be automatically moved to

the next storage pool hierarchy. Coy et al., however, also does not teach or suggest the above-

identified features of Applicants' invention. In particular, Coy et al. also does not enable the

partial migration of *portion(s)* of files from a first location to a second location. Coy et al. does

not even enable the identification of which files are migrated, merely that those files above a

threshold are migrated. See, e.g., Col. 1, line 66 to Col. 2, line 2. Accordingly, neither Ofek et

al. nor Coy et al., taken alone or in combination, can be said to teach or suggest Applicants'

invention.

Barve et al., Boebert et al., Sawada, Usdin et al., Glebov et al., Lam and Salas et al. were

cited for reasons relating to the dependent claims, but also fail to cure the above-identified

deficiency of root reference Ofek et al. with respect to the Applicants' independent claims. In

this regard, claims 2-21, 23-29 and 31-45 depend from claims 1, 22 and 30, respectively, either

directly or indirectly, and are believed allowable for the same reasons. Withdrawal of the

rejections under 35 U.S.C. § 103 is respectfully requested.

CONCLUSION

Applicants believe that the present Reply is responsive to each of the points raised by the

Examiner in the Official action, and submit that Claims 1-45 of the application are in condition

for allowance. Favorable consideration and passage to issue of the application at the Examiner's

earliest convenience is earnestly solicited.

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